

AMENDMENTS TO THE SPECIFICATION

Please amend the specification as follows:

Amend the title beginning on page 1 to read as follows.

ACTUATOR FOR DRIVING MOVABLE OBJECT AND MOTION GUIDE
APPARATUS FOR GUIDING MOTION OF MOVABLE OBJECT

Amend the Paragraph beginning on page 2, line 16, to read as follows.

In order to solve the above problem, the actuator ~~recited in claim 1~~ of the first aspect of the invention comprises: a hollow track member (6) having a slit extending in an axial direction thereof; a movable member (7) disposed inside the track member (6) to be movable along the track member; and a drive mechanism (17) for moving the movable member (7) along the axial direction of the track member (6), wherein the track member (6) has, in a section perpendicular to the axial direction of the track member (6), a guide portion (9) for guiding movement of the movable member (7) and an extension (11) extending from the guide portion (9) so as to cover the movable member (7), and a width (W1) of the slit (8) of the track member (6) formed between the opposed extensions is narrower than a width (W2) of the movable member (7).

The invention of ~~claim 2~~ the second aspect is characterized in that, ~~in the actuator of claim 1,~~ a single slit (8) is formed in a circumferential direction of the track member (6) in a section perpendicular to the axial direction of the track member.

The invention of ~~claim 3~~ the third aspect is characterized in that, ~~in the actuator of claim 1 or 2,~~
the track member (6) has a substantially circular-arc shape in section.

The invention of ~~claim 4~~ the fourth aspect is characterized in that, ~~in the actuator in claim 1 or 2,~~ the track member (6) is formed with a rolling member rolling groove (9) extending in the axial direction thereof as the guide portion (9), the movable member (7) is formed with a loaded rolling member rolling groove (13) opposing to the rolling member rolling groove (9) formed to the track member, and a number of rolling member (10) are interposed between the rolling member rolling groove (9) of the track member (6) and the loaded rolling member rolling groove (13) of the movable member (7) to be rollable therebetween.

The actuator of ~~claim 5~~ the fifth aspect is characterized in that, ~~in the actuator of claim 1 or 2,~~ the track member (6) is provided with a cover member (21) to be expanded or contracted in the axial direction of the track member (6) so as to entirely cover the track member (6) in the section perpendicular to the axial direction of the track member, and a portion of the movable member (7) projecting over the slit (8) of the track member penetrates the cover member (21).

The actuator of ~~claim 6~~ the sixth aspect comprises: a hollow track member (6) having a slit extending in an axial direction thereof; a movable member (7) disposed inside the track member (6) to be movable along the track member; and a drive mechanism (17) for moving the movable member (7) along the axial direction of the track member (6), wherein the track member (6) has a substantially circular-arc shape in a section perpendicular to the axial direction of the track member.

The actuator of ~~claim 7~~ the seventh aspect is characterized in that, ~~in the actuator of claim 6,~~ the drive mechanism (17) is provided with a screw portion formed to the movable member (7) and a

screw shaft (17) to be screw engaged with the screw portion, the screw shaft (17) penetrating the movable member (7), the screw shaft has a center line coincident with a center line of an output shaft of a drive source (31) rotating the screw shaft (17), and the drive source has an outer substantially circular shape in a section perpendicular to the axial direction of the track member (6).

A motion guide apparatus ~~recited in claim 8~~ of the eighth aspect of the invention comprises: a hollow track member (6) having a slit (8) extending in an axial direction thereof; and a movable member (7) disposed inside the track member (6) to be movable along the track member, wherein the track member (6), in a section perpendicular to the axial direction of the track member, has a guide portion (9) for guiding movement of the movable member (7) and an extension (11) extending from the guide portion (9) so as to cover the movable member, and a width (W1) of the slit (8) of the track member (6) formed between the opposed extensions (11) is narrower than a width (W2) of the movable member (7).

Effect of The Invention

According to the invention of ~~claim 1~~ the first aspect, the sectional shape of the track member approaches a closed curved line, and in spite of the compact outer dimension, the second moment of area can be made large. For this reason, an actuator having high rigidity such as flexure rigidity, torsional rigidity and the like can be obtained.

According to the invention of ~~claim 2~~ the second aspect, by forming only one slit in the circumferential direction of the track rail, the rigidity can be made further higher. Since the inside of the actuator can be easily sealed, an actuator having improved dust preventing performance can be provided.

According to the invention of ~~claim 3~~ the third aspect, in spite of the most compact outer dimension, an actuator having high rigidity can be obtained. In addition, since the degree of freedom for arranging the guide portion of the track member can be enhanced, the guide portion can be located to the most suitable position in accordance with a load to be applied to the movable member.

According to the invention of ~~claim 4~~ the fourth aspect, the movable member can be smoothly moved.

According to the invention of ~~claim 5~~ the fifth aspect, the highly improved dust preventing effect can be attained with the function of the actuator for moving the movable object being maintained.

In the conventional actuator, the bottom surface of the track rail was formed to be flat, (that is, the track rail is formed so as to provide a U-shape in section), for easy mounting to the flat fixing member such as bed. As in the invention of ~~claim 6~~ the sixth aspect, by forming the track member so as to provide a substantially circular-arc shape in section, in the case of obtaining the same flexure rigidity as that of the track rail having U-shaped section, the track member can be made light. For this reason, the actuator can be preferably utilized for a portion at which the actuator is swung such as the front end shaft of an articulated robot. In addition, by forming the track member so as to provide substantially circular-arc shape in section, the uniform flexure rigidity to the load in every direction can be obtained. Furthermore, by forming the track member so as to provide a substantially circular-arc shape in section, the track member can be manufactured from a pipe, for example, resulting in easy working.

According to the invention of ~~claim 7~~ the seventh aspect, by making coincident the outer

shapes of the track member and the drive source with each other, an actuator having compact and slim structure can be obtained.

According to the invention of ~~claim-8~~ the eighth aspect, the sectional shape of the track member approaches a closed curved line, and in spite of the compact outer dimension, the second moment of area can be made large. For this reason, a motion guide apparatus having high rigidity such as flexure rigidity, torsional rigidity and the like can be obtained.